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Chern numbers on the Fermi surface of bcc iron IVO SOUZA, DANIEL GOSÁLBEZ, Universidad del País Vasco, DAVID VANDERBILT, Rutgers University — A metal whose Fermi surface contains sheets with nonzero Chern numbers is topologically nontrivial. This can occur when either spatial inversion (P) or time-reversal (T) symmetry is broken, and spin-orbit is present. Taking ferromagnetic iron as a prototypical T-broken metal, we determine the Chern indices of all the Fermi sheets, starting from a census of the isolated band touchings in the Brillouin zone. Although there are many band touching points carrying a topological charge, the Chern index vanishes for most Fermi sheets. The reason is that they surround P-invariant points in the BZ, so that the enclosed band-touching points come in pairs of equal and opposite charge. The exceptions are two small electron pockets on the [001] ΓH line parallel to the magnetization. Each of them encloses a single Weyl point, leading to Chern indices of ± 1. The contribution of these two pockets to the anomalous Hall conductivity is given, modulo a $\mathbf{G}$-vector, by their reciprocal-space separation, as in a magnetic Weyl semimetal. In order to resolve the quantum of indeterminacy $\mathbf{G}$ we plot isocontours of the Berry phase calculated along [010] strings of k-points, which carry the same topological information as Fermi arcs in the (010) surface bandstructure.

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